IAgrE Student Awards

NOMINATION SUMMARY

Student Project Award		
PROPOSER: (usually Course Director/Head of Department)		
Name: Emily Smith		
Position: Curriculum Leader (Agriculture)		
University/College: Sparsholt College, Westley Lane, Sparsholt, Winchester, Hampshire, SO21 2NF		
Contact details:	**Tel:** 01962797212	**Email:** evsmith@Sparsholt.ac.uk
DETAILS OF NOMINATION:		
Name of Student/Group of Students: Henery Gittins		
Personal contact details (i.e not college) to enable us to contact the student(s) once their course has ended: **Home Tel:** **Mob:** 07502938779 **Email:** gittinshenery@gmail.com		
Name of course studied: Advanced Technical Extended Diploma Land Based Engineering		
Period studied	**From:** September 2024	**To:** June 2026
Qualification to be gained: Level 3 Advanced Technical Extended Diploma		
Project Title: Horse vs Horsepower		
Details of material submitted with nomination: PDF Document of tasks.		
SIGNED BY PROPOSER:		**DATE SUBMITTED:** 22/10/26

If you wish to provide any additional information to support this nomination, please do so in a covering letter. When complete, return this form, together with the supporting documents, to

The Secretariat, IAgrE, The Bullock Building (Bldg 53), University Way, Cranfield, Bedford MK43 0GH
secretary@iagre.org

NB All work submitted is treated with complete Confidentiality; no part of the paper will be published by IAgrE except for the Title and Name of the winner in each category.

Covering Letter

I am delighted to submit Henery's project, *Horse vs Horsepower*, for consideration for the IAgrE Student Project Award.

Henry was an exceptionally conscientious student throughout his studies. He approached his work with maturity, care and a genuine desire to produce something of which he could be proud. This was particularly evident in his specialist project, where he demonstrated the commitment and independent approach required to take an initial idea and develop it into a substantial piece of work.

Horse vs Horsepower is a particularly engaging project title and reflects Henry's interest in exploring a subject within the land-based sector in a thoughtful way. Throughout the project, he demonstrated determination, attention to detail and a willingness to engage fully with the project process.

As his Curriculum Leader, it is a pleasure to see Henry's work being put forward for wider recognition. His commitment to his studies made him a student who stood out, and I feel that *Horse vs Horsepower* is a fitting representation of the effort he invested in his course.

I am therefore very pleased to submit Henry's work for consideration for the IAgrE Student Project Award.

Yours faithfully,

Emily Smith
Curriculum Leader – Agriculture
Sparsholt College

309 Undertake a Specialist Project in the Land-Based Sector

Task 1

Title:

Horse vs Horsepower

Aims/objectives

Aims/objectives 1	To research the costings of the tractor and the implement, and the costing of the horse and their implements
Aims/objectives 2	The maintenance needed for the tractor and their implement, maintenance of the horse and their implement. The costing of this
Aims/objectives 3	The enjoyment of using a tractor and the enjoyments of using the horse
Aims/objectives 4	The efficiency of using the tractor or the horse depending on the size of the land.
Aims/objectives 5	The experience needed to use a tractor and the implement, and the experience needed to use a horse and the implement.

Methodology

1. My first aim is to look at the costing of the tractor and the implement and the costing of the horse and the implement. To find this out, I am going to research on the internet what is the equivalent horsepower to a horse so I can use a fair comparison between a tractor and a horse. Once I have found the equivalent horsepower tractor, I will be looking at the initial costing on the brands website and how much it would be to buy the implement that I am going to use. Once I have added this all up, I will then look at the type of horse needed to pull the implement and how much it will cost to buy, including the harnessing needed to pull the

implement. Overall, this aim is to find out the initial cost of tractor and implement, and horse harness and implement.

2. My second aim is to work out what is going to be needed to maintain the tractor and the implement, and what is going to be needed to maintain a horse and their equipment. To find this out if will going to the brands dealership and questioning how much a service will be for the tractor that will be used and what is the overall maintenance costing. This includes any oil changes, fixes, and fuel that is going to be needed. After finding out the tractors needs, I will then go to a horse yard and find out the costs of the maintenance for a horse. This includes the farrier for shoes, bedding feed and vet bills. I will the collate this data together and determine what is more beneficial and cost effective to maintain each one.
3. For my third aim, I am going to be looking at the enjoyment of using a tractor compared to using and horse. To find this out, I am going to be going round to farmers and users of these implements and asking the how much they enjoy doing their job either on a tractor or using a horse to do the work. This can be the enjoyment of the actual work on the land and the enjoyment of looking after the tractor and the horses. I will the collect this data given to me and write down the pros and the cons between the two.
4. My fourth aim I am going to be looking at the efficiency of using a tractor or a horse. This can vary depending on the size of the land. To also find this out, I will be looking at the speed at which each one can work at and how long you can work them for at any one time. The availability of each one during the year, and the conditions that they can be worked in. overall this area is to show how efficient and versatile each area can be depending on the environment at the time and how much land a person has.
5. For my last aim and objective, I am going to be researching the experience that is going the be needed to use either the tractor on the land or the horse on the land. This will include the competency level that the operator will need to be at and whether they will need to have and previous qualifications to work the machines.

I have chosen to research all these different areas for my comparison of horse or horsepower because this will give others and I an all-around understanding of the cost that is needed for each one and how they can be used in the agricultural society. This project is to also undergo the investigation whether a machine is more enjoyable and capable than the traditional horse pulling method. Finally, this is to show that there are still multiple ways to run and maintain a farm area depending on the equipment that is at disposal to the owner and whether they want to become more modern or more traditional to the society.

For my project, I am going to be using 1 shire horse with a harness set and a chain harrow. I will be able to access this setup as my friend has a shire horse to drive. To compare to this, I am going to be using a similar horsepower tractor, the John Deere 655 compact utility tractor with a set of chain harrows. I will be able to access this as I know some friends in hunts forest group which supply John Deeres, and he is able to give me all the information necessary to complete this project.

Information sources (a list of a range of suitable sources with approximately a 300-word summary)

To carry out this research, I am going to be using a range of different information sources to find out the information that is needed to be able to compare the two elements of this project.

Firstly, I am going to be using the john Deere website alongside the hunts forest group to figure out the pricing of the 655 compact tractor and the all the details such as the engine, maintenance needs, capacity size, etc. Alongside this I will be looking at a range of websites such as eBay, Facebook marketplace, Vevor and Zaros to find out the prices of chain harrows that are of good quality and of a fair price. I will be looking at the different websites because this will allow me to compare between the different chain harrows before buying any random one. Not only will I be using websites, but I will also be asking users of the tractor and chain harrows and their thoughts of using this on their land. This will allow me to use the real-world experience of this process making my project more realistic rather than the data found online.

Secondly, I will be looking at many different websites for shire horses. This will include the shire horse society page, dragon driving, horse mart, etc. This will allow me to browse and compare the different prices for the quality of the horse. This will include the weight, height, age, gender; which all contribute to the pricing of maintenance and the pulling factor. I will then be travelling and exploring all the different shops around my area; such as Mole Valley, Blendworth farm, shedfeild horse shop. I will then be looking at the prices of the bedding and feed, collective the data and comparing the prices. I will then be contacting a farrier to ask how much it would cost to maintain and change the hoofs and shoes of the heavy horse. Furthermore, I will be asking any heavy horse owner about their experience with driving the horse and their enjoyments of this process. This will include the bonding and care of the horse whilst also the process of working the horse. This will allow me to collect the data needed to find out the enjoyments of driving horses and the efficiency of using them.

Overall, I will be using the internet and the branded websites to research and discover about the different equipment's needed. I will also be travelling to different dealerships and farm shops in person to ask the experts on the subject. Lastly, i will be going to the library to look at different books magazines and using the computers to find out my information.

Resources required

TITLE	PROS	CONS
BOOKS	They will cover a lot of in-depth detail of the specific subject as a book fill primary focus on what the subject is about	Some books can be old and will give outdated advice or facts. Such as pricings of things and advice towards areas.
MAGAZINES	They can be accessed easily being available in most shops around and are updated often meaning the information is up to date with the current affairs.	Can have their opposing opinions and can twist the truth behind one element

INTERNET	Readily available to all users trying to research and has many different sites which give instant information on the subject that you are looking for.	Can be misleading into some information as this is a place where multitudes of random false information can be posted.
TRADE LITERATURE	This will be specialised in the specific area that is wanted. Will give relevant key information but will also go into great depth.	Magy only give you their opinion on their brand of area needed e.g. tractors. This means you are unable to use only one source to compare the costings.
TELEVISION AND RADIO	Widley used throughout civilisation and can be listened to indie the house. Will be up to date with data and can be censored to have only true information	May have false information being shared on products and can give a bias towards certain areas.
SUBJECT EXPERTS	Will have masses amounts of knowledge of their subject and will be up to date with all the information that is needed to find out about the area.	May be bias to specific brands and not give an overall judgement to other areas within.

309 Undertake a Specialist Project in the Land-Based Sector

Task 2

Title:

Horse vs Horsepower

Aims/objectives.

Aims/objectives 1.	To research the costings of the tractor and the implement, and the costing of the horse and their implements
Aims/objectives 2.	The maintenance needed for the tractor and their implement, maintenance of the horse and their implement. The costing of this
Aims/objectives 3.	The enjoyment of using a tractor and the enjoyments of using the horse
Aims/objectives 4.	The efficiency of using the tractor or the horse depending on the size of the land.
Aims/objectives 5.	The experience needed to use a tractor and the implement, and the experience needed to use a horse and the implement.

Specific operations

My first aim and objective will be achieved by looking at specific websites on the internet, e.g., Hunts Forest Group to look at the tractor that I am going to use. This will allow me to then find out the costing of the tractor and all other information such as the horsepower and the additions that I can put onto before buying to make for a better experience. I can also travel to the dealership in person to have a chat with one of the sales experts to get more detailed information about the tractor and the prices of them. This will allow me to gain more knowledge of the additions that can be placed on and their benefits of using them. I will then look at websites such as the shire horse society which will give me a wide range of horses to choose from showing me the prices of each and their capability. This will allow me to decide whether

they are suitable for my needs, e.g., pulling a chain harrow. I can also have a chat with people from within the society and get their opinions on the ideal horse that I will need to conduct this research. Overall, giving me a price range, I will have to meet. Finally, I will be looking at specific websites such as Facebook marketplace, eBay, vevor, etc, to find a suitable chain harrow set for both the tractor and the horse. I will be asking experts on what size chain harrow they recommend using on my specific tractor and to use on a horse, allowing me to have the max efficiency when working. Looking on the same websites, I will also be on the search to find the best harness set for a horse that is of a reasonable price.

My second aim and objective will be achieved by phoning up workshops such as hunts forest group and other independent companies such as Hollies engineering to gain the knowledge and understanding of how much it will cost to fully service the vehicle, just oil change, fuel to run the machine etc. by finding this all out I will then be able to get and overall cost for all the maintenance that I required for the tractor to see whether it is cost effective to run the machine for the job at hand. Secondly, I will be asking other shire horse owners how much it will cost to support their horses of an equivalent size. This will include the costing of, bedding, feed, farrier, vets, rugs. This pricing for the horse will allow me to total up the cost of supporting over a period and see how cost effective this is. Lastly, I will be asking agricultural engineers how much it will cost to fix a set of chain harrows if the is a problem with them, e.g., breakages. This will then allow me to find out how cost effective that set of chain harrows will be and I can then add the costing to each side of my investigation to whether horse or horsepower is better.

My third aim and objective will be achieved by travelling to different farmers and friends who use either a tractor or a horse to do some chain harrowing; investigating their enjoyment that they have whilst working on their land, and their enjoyments of maintaining the tractor/ horse. I will be able to do this by giving them a survey that they will complete and for them to give me feedback on their opinions. I will then be able to collect all this data into one document and give my report on the wide range of publics views on the enjoyments of either using a tactor or a horse. To carry out this aim and objective I understand that many farmers will not be using the tractor that I am researching, (John Deere 655) so I will just be broadening my search to how enjoyable it is to run a tractor in the field and harrow; using a tractor of a similar size, but not the exact tractor. This can also be done for the horse as

some shire horses slightly vary in size and build. However, all this aim is for is to gain the knowledge of farmers enjoyments of using tractors or horses to work in their fields.

My fourth aim and objective will be achieved by using a specific size of land, and researching through asking farmers and using websites to see how efficient the tractor and the horse is when chain harrowing that specific field. To be able to find out the efficiency, I will be looking at how long each one can work for, how much fuel the tractor will use over the span of the field, how fast they can travel over the field. This will allow me to figure out with the certain size of harrow, how long they will have to work for through the day before completing the specific sized field. To also improve on the efficiency, I will be asking the experts whether or not they can be used through all seasons of the year and does that vary or impact anything, e.g., will the horse need a rug on to keep warm, or will the tractor run more efficiently in the winter as there is more of a higher density air flow that a still airflow during the dead of summer. Not only is this about the tractor or the horse this objective, but I will also be looking at whether it will be efficient for the person who is the operator as they will be affected by their mobility, age, weather and many more constraints to be taken into consideration.

My fifth aim and objective will be achieved by looking at rules and guidance websites, such as government polices to see whether there is any licences or training that is necessary use this implement; depending on whether this is your own land of somebody else's land. Apart from having any qualification to use the machinery, I will also be looking at how much experience somebody may need to have to be able to complete this job efficiently and successfully with minimal mistakes. I will be able to find this out by asking any farmers and operators how long they have been chain harrowing for in tractors or with their horses and how long it has taken them to get up to a certain standard.

Overall, I have chosen to research and go into depth for all these five objectives to allow me to get a broad understanding into the whole operations for chain harrowing a field with a tractor or a horse. This will then give me a full report on whether the horse or horsepower is more cost effective, efficient, stable, enjoyable; allowing farmers to take into consideration on what they might want to use on their farm. I have also chosen this to research as I would like to promote that farmer do not always have to be up to modern

day technology but can also stay traditional like their ancestors did back in the day before tractors were widely used in operations.

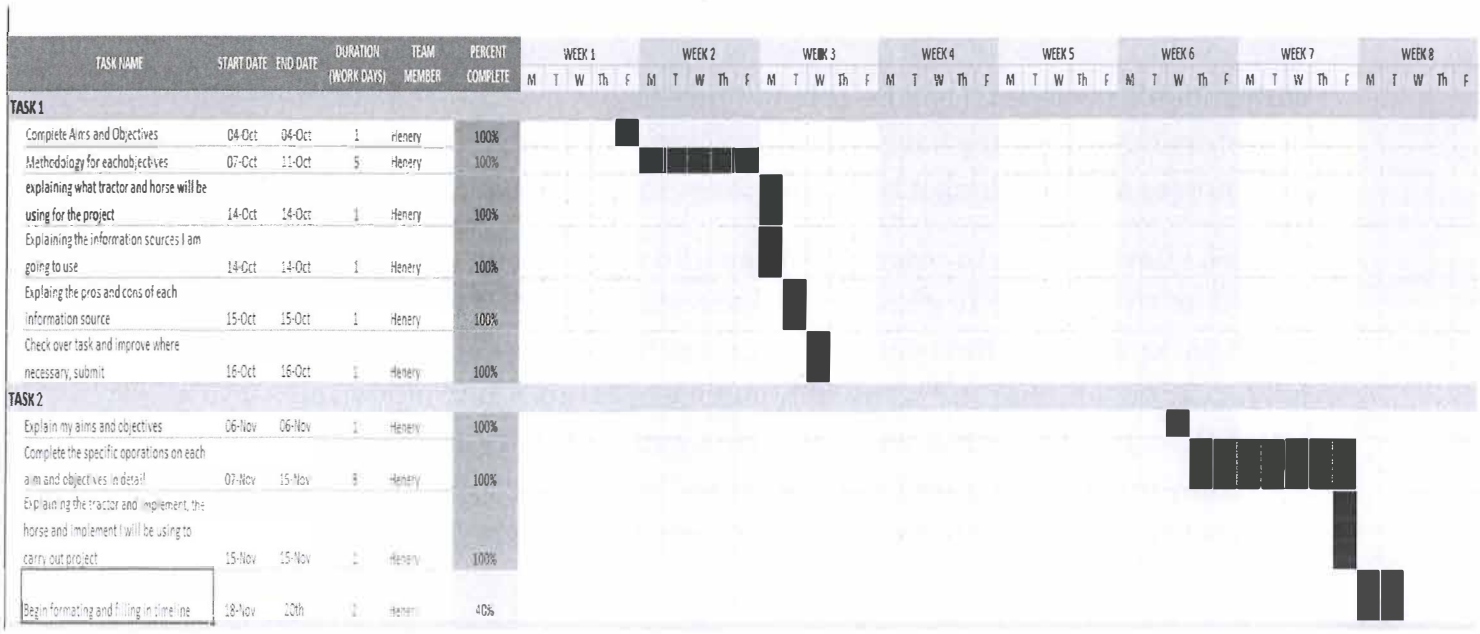
As told in Task 1, I will be researching using one shire horse, harness set and chain harrows for the horse side of the investigation. I will also be researching the John Deere 655 compact utility tractor with a set of chain harrows. This will allow me to search for the costing of a tractor and other areas that need a specific tractor that has a similar work power to a shire horse. Whereas on more broad areas such as the enjoyment I will be using a general understanding of using any tractor on the farms, building a higher amount of information for my report.

For my project, I will be able to access all this information easily as I have friends in specific areas at Hunts Forest Group, and I have friends in the new forest who have their own land and chain harrows. This will allow me to get a representation of chain harrowing with a tractor and with a horse.

Timeline for project

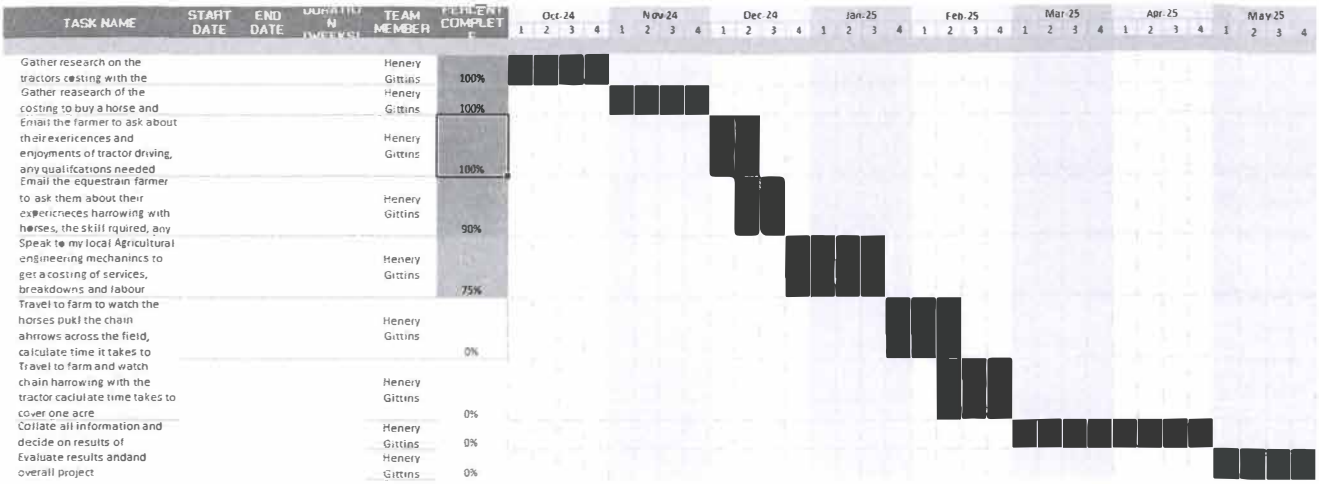
The timeline is used to show all the different steps taken to complete each section in each task throughout this whole researching project. A timeline can be shown in many different formats depending on the needs for different companies and their preferences.

GANTT CHART:



TASK NAME	START DATE	END DATE	DURATION (WORK DAYS)	TEAM MEMBER	PERCENT COMPLETE
TASK 1					
Complete Aims and Objectives	04-Oct	04-Oct	1	Henery	100%
Methodology for eachobjectives	07-Oct	11-Oct	5	Henery	100%
explaining what tractor and horse will be using for the project	14-Oct	14-Oct	1	Henery	100%
Explaining the information scurces I am going to use	14-Oct	14-Oct	1	Henery	100%
Explaing the pros and cons of each information source	15-Oct	15-Oct	1	Henery	100%
Check over task and improve where necessary, submit	16-Oct	16-Oct	1	Henery	100%
TASK 2					
Explain my aims and objectives	06-Nov	06-Nov	1	Henery	100%
Complete the specific oporations on each aim and objectives in detail	07-Nov	15-Nov	8	Henery	100%
Explaining the tractor and implement, the horse and implement I will be using to carry out project	15-Nov	15-Nov	1	Henery	100%
Begin formating and filling in timeline	18-Nov	20th	1	Henery	40%

WEEK 1 WEEK 2 WEEK 3 WEEK 4 WEEK 5 WEEK 6 WEEK 7 WEEK 8
M T W Th F M T W Th F M T W Th F M T W Th F M T W Th F M T W Th F M T W Th F M T W Th F



TASK NAME	START DATE	END DATE	DURATIO N (WEEKS)	TEAM MEMBER	PERCENT COMPLET E
Gather research on the tractors costing with the				Henery Gittins	100%
Gather reasearch of the costing to buy a horse and				Henery Gittins	100%
Email the farmer to ask about their exericences and enjoyments of tractor driving, any qualifcations needed				Henery Gittins	100%
Email the equestrain farmer to ask them about their experiencnes harrowing with horses, the skill rquired, any				Henery Gittins	90%
Speak to my local Agricultural engineering mechanincs to get a costing of services, breakdowns and labour				Henery Gittins	75%
Travel to farm to watch the horses pukl the chain ahrrows across the field, calculate time it takes to				Henery Gittins	0%
Travel to farm and watch chain harrowing with the tractor caclulate time takes to cover one acre				Henery Gittins	0%
Collate all information and decide on results of				Henery Gittins	0%
Evaluate results andand overall project				Henery Gittins	0%

This layout is called a GANTT CHART, which shows the operation, the dates that each section started and ended, how many days is that overall, who completed the task, have you met the deadline for each section by how completed the task is (%). Lastly this is then laid out on a timeline through weeks and the dates taken are marked in black to show the time each task takes.

This is an effective way to lay out a timeline for a project as this shows the basic information that is needed such as each operation. It also shows when each operation was started and completed; then plotted on a timeline to give that visual representation of how long the tasks for the project was going to take. Making the chart layout easy to understand like a GANTT CHART makes the process in an industry far easier.

PIE CHART:

Task 1	Days taken to complete
Complete Aims and Objectives	1
Methodology for each objectives	5
explaining what tractor and horse will be using for the project	1
Explaining the information sources I am going to use	1
Explaing the pros and cons of each information source	1
Check over task and improve where necessary, submit	1



This layout is called a PIE CHART, which shows the data that has been written down, turning it into a PIE. What this does is, it will take data from a table (left hand side) and will then transfer this onto a pie chart to show the days it takes to complete each task. Each segment in the pie chart shows the number of days each colour coded section will take.

This layout can be an effective way to layout the data because putting it into a pie chart will give a visual representation on which section in task 1 will take longer and which ones will be shorter.

CALENDAR:

TASK 1

OCTOBER

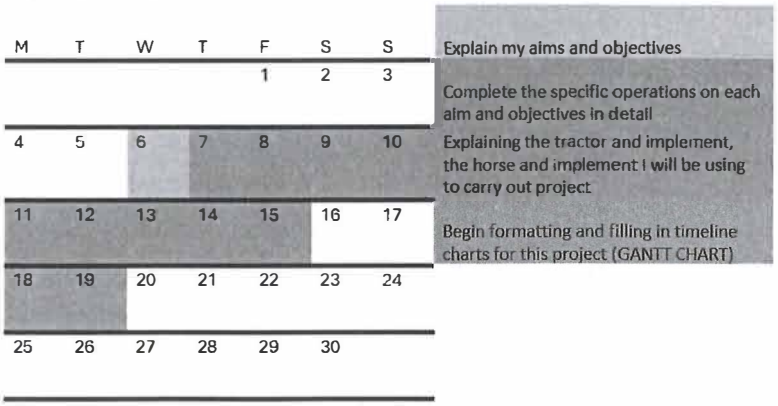
M	T	W	T	F	S	S	
	1	2	3	4	5	6	Complete Aims and Objectives Methodology for each objective
7	8	9	10	11	12	13	explaining what tractor and horse will be using for the project
14	15	16	17	18	19	20	
21	22	23	24	25	26	27	Explain the pros and cons of each information source
28	29	30	31				Check over task and improve where necessary, submit

This is the calendar layout, and this shows the days of the week just like on the calendar. This will take the aim/objectives that each task has and will lay out on the calendar what day they will be completed on and for how long they will take to complete. Each different objective is shown in a distinct colour key to give a clear representation to the user.

This layout is an excellent way to layout the timeline for a project as this shows the calendar month and how long each objective is going to take using the calendar dates. By using the bright colours to represent each objective is an effective way to make the time needed stand out and easily understandable.

TASK 2

Overall, these three separate ways to show the timeline for a project, are the quickest and easiest way to plot and represent for the employees and even customers. By using timelines, this gives the engineers a deadline to meet for each different aim. Keeping the whole task on track making sure not to fall behind.



Theses timelines will be completed through all the different four tasks when necessary. Keeping the starting and completion dates on track.

TIME REQUIRED:

Task 1- This section of the assignment will be completed within a month as said on the timelines. This will give me plenty of time start and complete this task before the hand-in date.

Task 2- This task will take slightly longer than task one as this will delve deeper into the specific information and other data gathering. This is the time that has

been allotted for the launch date to the hand-in date. Beginning in November and ending in mid-January

Task 3 and Task 4- these two tasks of the assignment will be completed in a longer period. As we have not been given a launch or completion date, I plan that this half of the assignment will take the rest of the college year. This is because this is the research half; that will take longer period to gather all the different information process the data and finally compare the two. After comparing, there will also be an evaluation to reflect on the process of this whole project and my approach towards this.

RESOURCES REQUIRED:

I am going to need to need access to various equipment to be able to conduct my research between horse vs horsepower.

Horse:

For this half of the research, I will need access to a horse and a harness set that attaches to a set of chain harrows. The cost of a horse, harness and chain harrows will be costly. However, I can carry this research on a shire horse that one of our local farmers owns who can drive on chain harrows. This means that there will be minimal costs towards this side of the research. The only cost is the furl for travel to the farm. In conjunction to this, I will be able to note down the costs of upkeep for their shire horse. I have chosen to use the shire horse because this will keep the costs down to complete my research by not having to buy my own or loan one to find out the details.

Horsepower:

For this half of the research, I am going to need to have access to a tractor and chain harrows. Again, there could be an expensive cost towards a tractor, and the chain harrows. However, I will be able to contact a local farm who has the specific tractor that I am comparing, asking them if I can use their tractor to complete my project. This will also give me the chance to ask them about their enjoyability of chain harrowing of the tractor and how long it takes to chain harrow a field. Overall, this will keep costs down when researching.

RESOURSES	SUITABILITY	AVAILABILITY	COST

People (Farmers, Equestrians)	Using farmers and equestrians will be suitable for this project as they will have built up knowledge of the subject and will have easy access to the resources needed. The research that I will be completing is not out of the usual for the farmers, meaning they will be extremely suitable for my project	I have been in contact with the farmer and the equestrians to check with their availability, which they are happy to help with assisting on my project.	There will be low costing to get to these people as they will allow me to borrow their equipment for free.
Time (how much time will it take, when am I going to complete this within the working week)	During the working week (mon-fri) I am not in college on a Monday and Tuesday. This means that this is a suitable amount of time to travel to the farmer and equestrians to conduct my research.	I will be available to use the two days of the week to conduct research on the farm. I have been in contact with the farmer, and they will be able to have the time through the week to help me with my research.	If necessary, I will pay the farer for taking up their time so they can allow me to use their land and equipment over the time needed.
Buildings (where will I complete this, what arrangements do I need)	I will need to complete my project research in a field, meaning that the field needs to be suitable (hard ground to not get stuck) and have a large enough area to conduct a fair test for how long it will take. I will have to know the size of the land to be able to calculate how long it would take to chain harrow one field. This means that it must be a suitable farmers field rather than a random field.	I have contacted the farmer to check whether they have a field that is available to chain harrow in as he may have arable fields with crops in. They will have a grass field available for me to use when needed	I will not need to higher out a building to be able to complete this project as the farmer has said they will need to harrow the field anyway. Meaning that there is not cost for experimenting the chain harrowing.
Equipment (what equipment do you need)	I will need to use the sane size chain harrows on the field to get a fair test when compare the horse and the tractor. This means the chain harrow	All this equipment is already owned by the farmer, meaning that this is all going to be	If needed I will pay the farmer for borrowing the equipment. However, this will

	must be a suitable size to fit both areas. I am using a suitable sized tractor that is comparable to the shire horse.	available when needed.	more cost effecting than hiring the tractor from the dealership.
Animals (what animals do I need)	I will be needing to use a shire horse for my project. This is a suitable breed of horse as they are bred for driving, meaning they are easily used for chain harrowing.	On the farm, they have a shire horse who is capable of driving chain harrows making him available to compare to the farm's tractor.	There would be a cost to use the horse however this would be minimal as the farmer is allowing me to borrow his equipment in purpose for research.
Materials (what materials will I need or use during this project)	I will need a suitable way to record my research, meaning that will need a pen and notebook to note down key information when researching. I will also need a laptop to write up my data and results.	All of this is available in any shop near me.	I already have a laptop meaning I will not need to pay for this. However, the price for a small notepad and pen will be minimal to be able to jot down information
Literature and media e.g. internet, trade magazine (giving examples of these including articles and photos)	I will be using and wide range of media and literature that is going to be suitable to me. This will include websites that gives me specific information on the tractor's specifications. I will also be using email to email farmers asking them their opinions on using tractors/ horses to chain harrow their field.	The internet and emails will be readily available whenever I need them throughout the time of the project.	IT will not cost me anything to use the internet or email people.
IT applications and budget.	I will be using email and phone to communicate with the farmer allowing me to easily speak to them	Using phone and emails is always available for me to	Using the ICT will not coat any thing to use.

(what ICT resources will I use and do I have a budget)	and make time to go and complete my project. There is minimal budget for this project which is suitable as this shows that anyone can conduct research without spending lots of money	contact who I need when I need to. By not having a high budget this will not allow me to experiment with bigger research projects, but this also shows that you can have a small budget available and still carry out a research project as long as you use the ICT applications to communicate and come to agreement with people.	There will be a small budget to pay for furl for travel but other than that not much is needed to use the equipment and complete the research.

For all the resources that are needed for this project, there will be a minimal cost to be able to use them. However, for my project, I will be looking at the prices of the machines, horses and all of their extras, such as upkeep and services. This will show the true price of owning such things for chain harrowing. This means that to conduct my research there will be low cost, but the project will give the farmers and idea of the costing to use all these equipment for chain harrowing if necessary.

Possible Disruptions to my project and contingencies:

Throughout this project, there could be some possible disruptions that may cause me to stop researching and have to extend the time it tasks to complete one task. I may also have to come up with a contingency plan to change the way I approach this project.

Illness: If I have an illness, which is too major to continue, I will take time to rest and heal before continuing with the project. This will cause me to extend the time that the research is conducted in.

IT problems: at any point I experience IT problems, I will continue with the research and jot down any data and information I need on my not pad; then update onto my research file on the computer.

Resource problems: If there are any problems with the resources, e.g. I run out of paper, or my pen runs out, I will have to travel to a shop to buy some more. This may slightly delay my project.

Tractor breakdown: If the tractor that I am using has a breakdown, I will then need to find the problem and fix it or call someone to fix it. This will then put a delay on the horsepower side of the project. However, I will be able to continue with the horse side of the project or continue filling in data. If necessary, I will

Injury with the horse: If the horse becomes injured, I will have to let him rest and recover. If there is too slow of a recovery I will have to source another shire horse of equivalent size.

Broken chain harrows: If the chain harrows break, there will be a slight delay before continuing as we will have to buy replacement part to fix. If they are unfixable, I will have to find a new set of chain harrows to use.

Travel issues: I am unable to drive due to my age, there may be some issues with transport. If I am unable to get transport with a car, I may have to find a different solution to travel; or wait till someone can drive me.

Cost: If there is any problem with cost, I will have to find a different and cheaper way to approach the project if necessary.

309 Undertake a Specialist Project in the Land-Based Sector

Task 3

Title:

Horse vs Horsepower

Risk assessment:

SPARSHOLT COLLEGE HAMPSHIRE
ANDOVER COLLEGE

Section:

Operation /Task being assessed: Tractor driving/ chain harrowing.

Generic Hazard & Risk

Assessor name		***Date completed***	22/01/25	***Review date***	22/01/26

Define the potential hazard / harm		**Indicate who might be harmed**				**State the actual control measures in place to reduce the risk**	**Severity**		**Frequency**		**Risk Rating**
		Staff	**Learners**	**Visitors**	**Others**						
1	Moving machinery	X	X			Be careful when moving the machinery about the yard and be aware of your surroundings. Ensure the area around is clear before moving off in the tractor. When operating the machinery, make sure to wear a seatbelt.	3	X	1	=	3
2	Linking machinery to tractor	X	X			Turn the tractor off when linking the machinery to ensure there is no random movement causing a crush incident. Use the correct procedure to link up the machinery to the tractor. Double check that all connection points are fully connected before moving off.	2	X	2	=	4

3	Animals				X	Be aware of the surroundings. If possible, move the animas to a different area before commencing chain harrowing. If not possible, be aware of surroundings and stop if necessary.	2	X	1	=	2
4	Slips/trips/falls	X	X	X		When working on or around the machine, be aware of the ground condition. Ensure you are wearing the correct footwear. Move any obstacles within the area. Complete a dynamic assessment on the day.	2	X	2	=	4
5	Static obstructions	X	X			When moving to and from field and working in the field, ensure all objects or restricted areas are clearly marked to show to avoid these.	2	X	1	=	2
6	Weather conditions	X	X	X		Check weather conditions before hand and wear suitable clothing. Assess the ground and area before commencing work	1	X	1	=	1
7	Machinery operator	X	X			Ensure that the operator has sufficient training in the use of the tractor before allowing to continue. Ensure the operator is wearing the correct PPE	2	X	1	=	2
8	Condition of operating area	X	X			Check the surface of the ground and avoid holes or long grasses areas to avoid getting stuck	2	X	1	=	2

9	Crush	X	X			Do not stand in between tractor and implement. If necessary to, turn engine off and ensure the tractor is in park. Be aware of moving components to the implement and carful attachment to not crush fingers	3	X	2	=	6
10	Pre-start checks	X	X			When checking over the tractor before starting, be aware of the hot areas (e.g., exhaust). Be aware of high-pressured lines, (e.g., hydraulic hoses), ensure all oils are toed up and at a significant level.	2	X	1	=	2
11	Lifting and lowering 3-point hitch	X	X			Do not stand near the rear of tractor when operating the hydraulic hitches. Keep body out of way when lowering implements.	1	X	2	=	2
12	Turning circle	X	X			When operating machine be aware to not take too tight a turn with the harrows on the back as this can cause entanglement and entrapment. If entanglement happens on the chain harrow, ensure correct PPE is worn to untangle and be careful to not trap any body parts onto chains and sharp objects.	1	X	3	=	3
13	Noise level	X	X			When near or operating the machinery, ensure to wear ear protection. This will fall under the correct PPE to wear when operating.	1	X	1	=	1

Severity Rating
1. Trivial injury
2. Minor injury, requires first aid
3. Major injury, disabling or disease
4.Fatality

Frequency Rating
1. Improbable – Unlikely though conceivable
2. Possible
3. Occasional
4. Regular

Risk Rating
1 – 4 Acceptable risks. No remedial action necessary
6 – 8 Further control measures to be evaluated and implemented
9 – 16 Activity not to take place until a full review can be carried out, the risk has been reduced, control measures are in place and a new assessment has been completed.

SPARSHOLT COLLEGE HAMPSHIRE ANDOVER COLLEGE

Section:
Generic Hazard & Risk Assessment Page 2

Where the risk rating ***exceeds 6 for any component part of the activity*** specified additional control measures must be introduced to reduce the hazard or risk. The following measures ***are considered necessary and are to be implemented*** whenever the activity is carried out.

Item from overleaf		Additional control measures	Review Date
9	Crush	Have addition discussion beforehand to all people involved in the activity to ensure all knowledge and understanding has been across, to ensure full safety. All people to keep an eye out when in a crush zone when operating to ensure all peoples safety. Operator must show the key to someone to show the tractor is in their control and will not be operated by someone else	

Declaration (***Note:*** A ***'specific' risk assessment linked to generic*** is to be completed (as appropriate), ***each time the activity is undertaken*** to identify any factors ***which may increase*** the potential hazards or risks previously identified.)

I have carried out this '***generic' hazard and risk assessment*** on the date as specified on page 1. I consider that the hazards and risks identified are acceptable providing that the control measures (and if specified any additional control measures) are implemented.

Name/designation of person completing this form:		**Signature:**		**Date:**	**07/02/25**
Name of departmental verifier:		**Signature:**		**Date:**	

SPARSHOLT COLLEGE HAMPSHIRE
ANDOVER COLLEGE

Section:
Generic Hazard & Risk

Operation /Task being assessed: Horse driving/chain harrowing.

Assessor name		***Date completed***	23/01/25	***Review date***	23/01/26

	Define the potential hazard / harm	**Indicate who might be harmed**				**State the actual control measures in place to reduce the risk**	**Severity**		**Frequency**		**Risk Rating**
		Staff	**Learners**	**Visitors**	**Others**						
1	Slips/trips/falls	X	X	X		When working on or around the machine, be aware of the ground condition. Ensure you are wearing the correct footwear. Move any obstacles within the area. Complete a dynamic assessment on the day.	2	X	2	=	4
2	Grooming horse	X	X		X	Ensure you are slow and carful when approaching the horse to avoid getting kicked or crushed when the horse moves. Ensure you are being gentle when grooming to not injure the horse	2	X	1	=	2

3	Tracking up the horse	X	X		X	The equipment on the horse may be heavy so be careful when putting on horse to not trap any fingers or hurting the horse with the chains	1	X	1	=	1
4	Moving the horse around the yard and field	X	X		X	Ensure the area is clear and safe before moving the horse around the yard. Warn people that the horse is walking around so they know to be aware.	1	X	2	=	2
5	Attaching chain harrows		X		X	Ensure someone is holding onto the horse to keep them calm and still whilst another operator attaches the implement to the Whipple tree (connection to the horse)	2	X	2	=	4
6	Handling the chain harrows		X			When moving the chain harrows to the correct position on the horse, watch for fingers and sharp edges	2	X	1	=	2
7	Animals		X		X	ensure that the animals are moved out of the operating field to ensure that the horse does not get spooked or bolt off when working. If not possible be aware of the surroundings and keep livestock away from the horse when chain harrowing.	1	X	1	=	1
8	Condition of operating area	X	X			Check the surface of the ground and avoid holes or long grasses areas to avoid getting stuck	2	X	1	=	2
9	Static obstructions	X	X			When moving to and from field and working in the field, ensure all objects or restricted areas are clearly marked to show to avoid these.	2	X	1	=	2

10	*Weather conditions*	X	X	X		Check weather conditions before hand and wear suitable clothing. Assess the ground and area before commencing work	1	X	1	=	1
11	Turning circle	X	X			When operating machine be aware to not take too tight a turn with the harrows on the back as this can cause entanglement and entrapment. If entanglement happens on the chain harrow, ensure correct PPE is worn to untangle and be careful to not trap any body parts onto chains and sharp objects.	1	X	3	=	3
12	Horses' unpredictable behaviour	X	X		X	Be aware of the horse's behaviour and keep an eye on them. Horse will have unpredictable behaviour and be aware of the procedure to calm them and keep them and other people safe.	3	X	2	=	6

SPARSHOLT COLLEGE HAMPSHIRE
ANDOVER COLLEGE

Severity Rating
1. Trivial injury
2. Minor injury, requires first aid
3. Major injury, disabling or disease
4.Fatality

Frequency Rating
1. Improbable – Unlikely though conceivable
2. Possible
3. Occasional
4. Regular

Risk Rating
1 – 4 Acceptable risks. No remedial action necessary
6 – 8 Further control measures to be evaluated and implemented
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Section:
Generic Hazard & Risk Assessment Page 2

Where the risk rating ***exceeds 6 for any component part of the activity*** specified additional control measures must be introduced to reduce the hazard or risk. The following measures ***are considered necessary and are to be implemented*** whenever the activity is carried out.

Item from overleaf		Additional control measures	Review Date
12	Horses' unpredictable behaviour	Advise everyone present the correct way to detach the chain harrows if there is an issue with the horse. Always have prior knowledge about horses before using them and keeping them. Ensure the field that is being chain harrowed is shut off so if the horse does get loose, there is no chance of them getting out. Keep steady control on the reigns to keep in control	

Declaration (***Note:*** A ***'specific' risk assessment linked to generic*** is to be completed (as appropriate), ***each time the activity is undertaken*** to identify any factors ***which may increase*** the potential hazards or risks previously identified.)

I have carried out this '***generic' hazard and risk assessment*** on the date as specified on page 1. I consider that the hazards and risks identified are acceptable providing that the control measures (and if specified any additional control measures) are implemented.

Name/designation of person completing this form:		**Signature:**		**Date:**	**07/02/25**
Name of departmental verifier:		**Signature:**		**Date:**	

Health and Safety Requirements:

Overall, when completing any operation, there is going to be health and safety requirements needed to be checked off before starting. When completing operations, the operator and bystanders who ae assisting will all need to wear the correct PPE. This will include ear protection (to prevent hearing damage from the noise of the tractors engine). This is necessary for this specific tractor operation as there is no cab to dampen any of the sounds. A MUST when completing any agricultural operation is to wear steel toe capped boots. This is a must as the steel toe cap will prevent any sudden impact from falling items or being stood on by the horse and many other events causing a crush on the foot. All participants must have had a briefing of the risk assessment beforehand to they understand the safety and action they are going to be taking part in. Before beginning any operation with the tractor, complete a full inspection (pre-start checks) a stated on the risk assessment to ensure full working condition on the tractor. When working with the horses, ensure the operator has extensive knowledge about the care and abilities of a horse. Ensure you have checked the horse to make sure that they are fit and capable of chain harrowing).

PPE Required/ Advised:



-**safety glasses** (to prevent any foreign body from entering the eye and causing sight issues)



-**Ear defenders** (to prevent any hearing damage)



-**Overalls/suitable covered clothing** (to prevent getting dirty or any oils any other contaminants getting on the clothes or the body)



-**Steel toe cap boots** (to prevent crush injuries on the foot)

Legislations:

Personal Protective Equipment Regulations 1992- This is the legislation that advises and enforces the need and use of PPE when completing activities.
-For this project, this legislation will be followed by the operator of the tractor and the operator of the horse will all wear steel toe cap boots, suitable clothing required, which all can be provided by the employer or the farm business.

Health And Safety at Work 1974- This legislation has been put into place to allow employees to follow the correct guidelines to work safely and prevent any injuries from occurring.
-For this project, this legislation will be followed as a risk assessment has been completed and there will be a briefing before carrying out any of the work, to ensure the safety of the team and the operator when undergoing chain harrowing.

Management of Health and Safety at Work Regulation 1999- this legislation ensures that the management system keeps up to date with their health and safety in their workplace.
-This legislation has been followed for this project, as the management team on the farm has been reviewed with their health and safety checks ensuring that they are up to date, keeping all the employees and the workers safe under operations.

Animal Welfare Act 2006- This legislation has been used in these areas of research as the will require me to ensure that the horse has a suitable environment to live/ work in and has a healthy diet.
-In this project, this legislation will be followed all throughout, as there will be a groom (someone who looks after the horse) there to ensure the horses health and welfare is up kept. This means that they horse is well looked after and in the right conditions to work.

Manual handling operations 1992- This legislation has been put in place to help reduce the risk of injury when moving heavy equipment manually.
-this legislation will be followed all throughout the project as all operators have had training and guidance on how to correctly attach the chain harrows to the horse or the tractor, being able to handle/ lift them correctly without causing any injures such as a back injury.

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013- This regulation has been put into place so that people have a recording of all the injuries that have occurred in a workplace so they know what safety features they can improve overtime.
-this will be followed through this project, as if any injuries occur whilst chain harrowing, they will be reported back to management and then there will be extra cause to minimise the risk of injury again, or further damage. Checking back to ensure that they were sufficient training and knowledge beforehand before carrying out this task.

All these legislations will be followed throughout the time on the farm, when completing my research.

Milestone 1:

To complete this milestone, I have collected all the prices and research information of the tractor and the implement, the horse and the implement, and the maintenance of each one. This is the step to completing aims/objectives 1 + 2.
To calculate the overall costings of maintenance, I am going to be using the prices for one month. This will include one months' worth of bedding, feed, farrier visit, vet bill. This will also include the cost of a hydraulic break down on the tractor in maintenance, one service, one full of fuel.

John Deere 655:

Cost to buy tractor- I am looking at all different second-hand sales of the John Deere 655 on all different websites. These websites include farming machinery locator, small tractors.co.uk, tractor house. These are all websites I have found on the internet that sell this specific tractor. I have also travelled around my local area, to ask if any auctions, farms are selling this type of tractor. When I collected this data, the prices were all slightly different, so I decided to take them all into consideration and use an average of them all to use in my research. To buy this machinery used, it would be an estimate of £3,500.

Engine specifications- To find out the specifications of this tractor I used a website called tractor data. I also used the manual to compare the data to ensure that they are accurate readings. The engine used in this machine is a Yanmar 0.7L 3-cylinder Diesel. The 655 specification states that the engine can produce up to 16 horsepower and at the PTO it will produce up to 10.6 horsepower, (I will not need to use the PTO in my project as I am pulling chain harrows). This means that the horsepower I am focused on is the engines output to the drive.

Fuel- To show the pricing of fuel for agricultural machines, I am going to be costing up the price to fully fill the tank of the john deere 655. This is to show the prices that will be included to run the machine. I have used the magazine Farmers weekly to find out the recent price of agricultural fuel. This week's price is 71p per litre of red diesel. The size of the tractors tank is 15.1 litres. This means that for a full tank of fuel it will cost £10.72.

Service cost- To find out the costing of a service on this machine, I spoke to my work, Hollies Engineering, to see how long it would take to service and how much it would cost in parts, oil and labour. Upon speaking to them it would cost around £172.79 For parts. The parts include, engine oil filter, fuel filter, air filters and a hydraulic filter. It would cost around £79.80 in oils and liquids (engine oil (10-40) £12.84, tractor transmission fluid £63.80, antifreeze £3.16). It would then cost around £300 in labour costs. Overall, for a full service on this John Deere 655 it would cost a total of £552.59

Hydraulic breakdown- In my research, I am going to include the price of a hydraulic breakdown. One of the most common faults on a tractors hydraulic system is leaking pipework and seals. This is why in my research I am going to add a hydraulic breakdown into my costings to keep a tractor for chain harrowing. For this hydraulic breakdown, I am going to include the cost for 1.5 metres of pipe, the ferrules, couplers and labour cost. The costing for the pipe will be around £10.50. The costing for the parts (ferrules, couplers) will be £8 finally the labour cost will be around £150. Overall, the total cost for a common hydraulic breakdown will be around £168.50.

Hollies Engineering is my local agricultural engineers, and they charge £75 per hour labour fees.

Chain harrows- The easiest website to find second hand chain harrows is on eBay. I am using the same chain harrows on the tractor and the shire horse meaning the size needs to be suitable for both. I have decided to use 4ft by 6ft chain harrows. When I research the chain harrows, I collated all the prices of different chain harrows and used and average for used harrows. This came out to be around £450.

Shire Horse:

Cost to Buy horse- I am looking at different websites that sell shire horses, which are preferably already broken to drive. Some of these websites include Horse Mart, Shire Horse Society, e horses. Just like the tractor, I have looked at all the listed prices for a shire horse, and will take them all into consideration, by using an average of them for my research. The average price of a shire horse that has already been broken to drive (chain harrows) is around £8,000.

Feeding- To find out how much feed is used for a shire horse; I had emailed a local who owns a shire horse. To make up the hard feed, this will consist of 2 scoops Emerald grass pellets, 2.5 scoops Honey chop oat straw chaff, and 2.5 scoops marriages broad bran. The grass nuts will cost £36.40 a month. The chaff will cost £12 a month. The bran will cost £19.50 a month. Lastly a round bale of hay will cost £50 per month. When calculating the overall cost, I will be pricing up the cost of feed for only one month. Overall, to feed the horse for a month, it will cost £117.90.

Bedding- When looking after a horse, they will need to have bedding in their stable. I will be looking at the costing of wood pellets people have recommended these because they are efficient in soaking up the urine and absorbing the smell. This is easy to muck out and you can keep as much bedding as possible. The average shire horse will use two bags of wood pellets a week. 1 bag = £5. This means that in a month, the cost of the bedding will be £40.

Vetting Bills- when looking after horses, they will need to have general vet check-ups to ensure their health and welfare are being properly managed. This can happen all throughout the year; however, I have taken a usual cost for a vet check-up and found a call out cost, and price of medications. This will be around £250.

Harness- When looking at a harness set, I had to look at the different sets and research the specific set that I am going to need. To pull chain harrows, I am going to need a working set. I spoke to a local farmer who has second hand harness sets, and they said that the average price for a working harness, second hand would be around £500.

Chain harrows- The easiest website to find second hand chain harrows is on eBay. I am using the same chain harrows on the tractor and the shire horse meaning the size needs to be suitable for both. I have decided to use 4ft by 6ft chain harrows. When I research the chain harrows, I collated all the prices of different chain harrows and used and average for used harrows. This came out to be around £450.

Farrier- In this project, I will be including one farrier visit as this is art of the maintenance to keep the welfare of the horse properly. I spoke to our local farrier who will shod shire horses and give them a set off shoes. They have said that the overall costing of this is going to be £180

John Deere 655 (Horsepower) 16hp	Shire horse (Horse) 15hp
Initial costing to buy: **£3,500**	Initial costing to buy: **£8,000**
Chain harrows: **£450**	Chain harrows: **£450**
Full tank of fuel: **£10.72**	Harness set: **£500**
Service: **£552.59**	Bedding: **£40**
Hydraulic breakdown: **£168.50**	Feed: **£117.90**
	Farrier: **£180**
	Vet check-up: **£250**
TOTAL: £4,681.81	**TOTAL: £9,537.90**

Milestone 2:

For this milestone, I was able to email different people, (farmer for the tractor, farmer for the horse) to find out their opinions of their experiences when chain harrowing. Giving feedback of their enjoyments that have when harrowing, any troubles they have, is there a negative view of having to harrow.

John Deere 655:

When chain harrowing with the tractor, they have said that they love to be able to get up and start chain harrowing. They can start whenever they want if the tractor is in working conditions. They have said that they enjoy chain harrowing the field as this can sense some progress on the field whilst looking at all the land completed. They have said that a positive for them is that they are able to continue chain harrowing whilst having a drink and something to eat. A positive is that because they are sat on the tractor whilst chain harrowing, they will not tire as easy as walking alongside the horse; especially if there is a large amount of ground to cover. A negative from chain harrowing with the John Deere 655 is that because there is no cab, the noise will be quite loud and can become straining on the hearing over a longer period. This means that they would have to put ear defenders on.

Shire Horse:

When chain harrowing with horses, they have said that they love harrowing with their horses as this gives them a sense of satisfaction. This is because there are using the horses for what they were meant for. (heavy horses were bred to be worked on farms, before machines were created). Once you have all the equipment, this is an easy way to keep the horses fit and healthy, whilst also completing farm jobs. The down sides they have said that this is more of a manual way to harrow the fields with more wavy lines, however if the farm doesn't have a tractor the horses are there to be worked. They have said this also

helps increase their fitness as they must keep control of the horses and walk around the fields with the horses. Overall, chain harrowing with horses they have said that the positives outweigh the negatives.

Milestone 3:

For this milestone, I was able to find out the efficiency of using either a tractor or shire horses to chain harrow. To complete this I was able to travel out to the farm to see the setting up and use of the tractor when chain harrowing. However, I was unable to get out to the horse and witness them chain harrow a field, however I was able to email the farmer, and they were able to send me some videos of them chain harrowing with their horses.

John Deere 655:

Setting up and adjusting the chain harrows on the tractor:
Before setting off to chain harrow a field, the tractor must be set up to the chain harrows, tested and adjusted where necessary for efficient harrowing. After emailing the farmer with the John Deere 655, they have said that it roughly takes them **20minutes** to set up.

Speed of travel: 6mph
From looking at the internet, and asking the farmer who owns this tractor, they have said that the average speed that the tractor can travel at with this specific chain harrow on is around 6mph. This is because this is the optimal speed to travel at to get the most efficient coverage and time.

Length of working time before a rest:
If the tractor is well maintained and there is a consistent cooling system; with a significant amount of fuel, then this tractor can work for a long period of time, meaning that there can be constant chain harrowing without resting. The only time that the tractor will have to stop and rest before beginning to work again is when the operator needs to rest or eat.

Time to cover a one acre:
One acre is approximately 208ft by 208ft or the equivalent. This will equal to about 43,560 square feet. To work out how long it will take I will do the calculations of the width of the chain harrow, the time it will take to do 1 lap of the headland, the time it takes to travel down the length of the field (1pass) and how many passes it will take to complete the field. (6mph= 8.8ft per second)
Time it takes to cover the headland: **1minute, 36 seconds.**
Time to complete one pass: **23seconds.**
How many passes: **50 passes**
Time to complete all passes: **19minutes.**
Overall time to complete one acre with no breaks: 20minutes 36seconds.

Overall:
To conclude this section, the overall time that it takes to fully set up adjust and complete one acre of chain harrowing, it takes **40minutes, 36seconds.**

Shire Horse:

Setting up the chain harrows on the horse's harness:

Before any work can be completed, the horse must be set up with the harness and then connected to the chain harrows. After speaking to an experienced farmer who often uses horses to chain harrow, they have said it roughly takes around **40 minutes** to fully set the harness u correctly and then position the horse in the right place to then attach and adjust the chain harrows.

Speed of travel: 4mph

When looking at data form the internet and speaking to local farmers who own the shire horses when chain harrowing, they have said that the shire horse will travel at around 4mph. This is because this is the most comfortable speed for the horse to pull at and not tire themselves out too quickly. Allowing for the chain harrow to work effectively.

Length of working time before a rest:

Upon speaking to local farmers who own horses and reading texts about horse pulling, it says that a fit heavy horse should be able to complete 3 hours of chain harrowing before resting. Depending on the terrain and fitness of the horse this can vary meaning breaks may have to be after a shorter period of working.

Time to cover one acre:

One acre is approximately 208ft by 208ft or the equivalent. This will equal to about 43,560 square feet. To work out how long it will take I will do the calculations of the width of the chain harrow, the time it will take to do 1 lap of the headland, the time it takes to travel down the length of the field (1pass) and how many passes it will take to complete the field. (4mph= 5.8ft per second)

Time it takes to cover the headland: **2minutes, 24seconds.**
Time to complete one pass: **34seconds.**
How many passes: **50 passes**
Time to complete all passes: **28minutes, 24seconds.**
Overall time to complete one acre with no breaks: 30minutes, 48seconds.

Overall:

To conclude this milestone in the horse section, the overall time it takes to fully set up the horse and chain harrows then complete one acre of harrowing, it will take **1Hour, 10minutes, 48 seconds.**

Milestone 4:

For this milestone, I will be emailing the farmers and equestrians, whether there will need to be some experience or training (including qualifications) to be able to chain harrow either using a tractor and harrows, or a horse and harrows. This will also include the differences between the level of competence needed to be able to perform these tasks to a good standard and how long it to the operator to get up to the correct standard of chain harrowing.

John Deere 655:

From a reply in an email, it says that to be able to use the tractor and chain harrows, you will need to have either a competency ticket if on local land, or even a tractor licence to be able to legal operate the tractor. This will take time and practice before achieving the licence. After achieving the licence, it will take time to confidently hitch up the harrows to the back of the tractor. Once hitched up it will take many practices to able to drive in straight lines across the fields. This means that overall, there will need to be some good experience to be fully competent to chain harrow as you will be operating machinery learning how to fully operate the harrows in the field and keeping to straight lines.

Shire Horse:

Unlike tractor licences, to use horse when chain harrowing, you will not need any licences. However, you will need to spend time learning how to care for horses and learn their behaviour patterns. You will also need to desensitise the horses to the sounds of the chain harrows getting them used to pulling the chain harrows. This means that it will take a long time to get used to looking after the horses and practicing working with them to keep in straight lines ensuring a proper coverage of harrows across a field.

Review of Action Plan:

Actions taken to remain on schedule:

Whilst completing this project, there have been some changes happen and some setbacks that have caused me to alter the plan to allow myself to still collect the relevant data whilst staying on track, meeting the deadlines.

College exams:

Throughout this project, I have been learning and studying for my first-year college theory exams. This meant that on some days, I have been unable to focus on this project and have had to prioritise revision for those exams. This has meant that I have had to research this task over longer period to allow me to collect all the data needed and to be able to still progress in other areas of life.

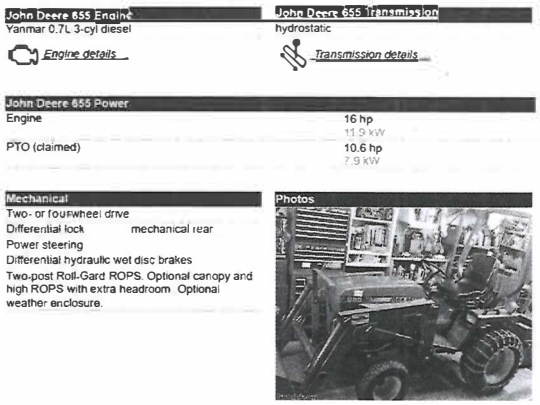
Weather:

Since this project is being carried out through the winter and beginning of springtime, the weather has had a huge impact on my ability to chain harrow in the fields. Chain harrowing is usually carried out through the end of the springtime, more into the summer where the fields are dryer and able to have heavy loads on the ground without causing too much damage, for example ruts being dug from the tires on the tractor. Due to the wet weather that has been occurring, this has set back the time that I have been able to carry out the physical research of this project.

Horse availability:

In recent events, the shire horse that was available to use for the chain harrowing, has injured their leg and has gone lame. This means that the shire horse is now on a rest period where they are currently recovering from the injury and unable to be set into a working condition. As this occurred days before I was due to travel to the farm to carry out the horse chain harrowing side of the project, I had to make quick changes and decisions on what I could do to still complete this section. The overall decision was to take this side of the project more research based rather than physically watching them chain harrow. I was able to contact a local farmer who chain harrows with their horses, and they were able to supply me with past videos and provide me with all the relevant information needed to complete the milestones and objectives.

Evidence for completing this project:





Good morning

As you know, I am completing a specialist project for my Agricultural Engineering course at Sparsholt College. I am researching the difference between using horses or tractors when chain harrowing; with different objectives to find out, allowing me to come to a decisive conclusion.

I would like to ask you various questions to be able to complete this project

1. Can you explain your experiences when chain harrowing? (positives, negatives, struggles, your enjoyment and what you get out of using the tractor to chain harrow)

2. How long does it take to set up the chain harrows on the back of the tractor?

3. Do you need any qualifications or experience to be able to chain harrow with the tractor; how long does it take to get competent with using them across a field?

If you could please answer these questions in detail, this would be much appreciated. any other relevant information that relates to these questions that you would like to add in would be more than welcome. If any further explanation is needed please drop me an email.

Kindest Regards

Good morning,

As you know, I am completing a specialist project for my Agricultural Engineering course at Sparsholt College. I am researching the difference between using horses or tractors when chain harrowing; with different objectives to find out, allowing me to come to a decisive conclusion.

I would like to ask you various questions to be able to complete this project

1. Can you explain your experiences when chain harrowing? (positives, negatives, struggles, your enjoyment and what you get out of using horses to chain harrow)

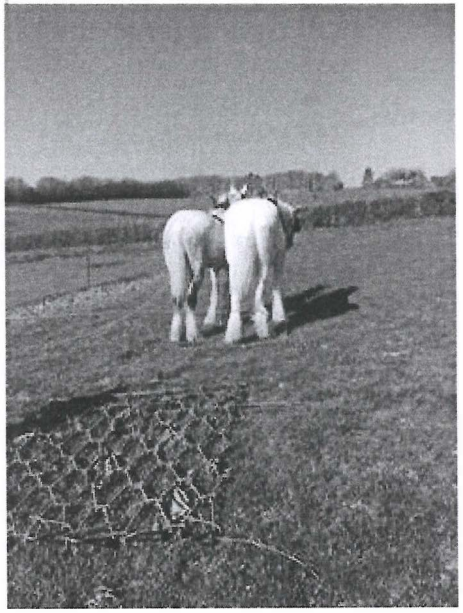
2. How long are you able to work the horse over a period of time before they have to rest and recover before starting again?

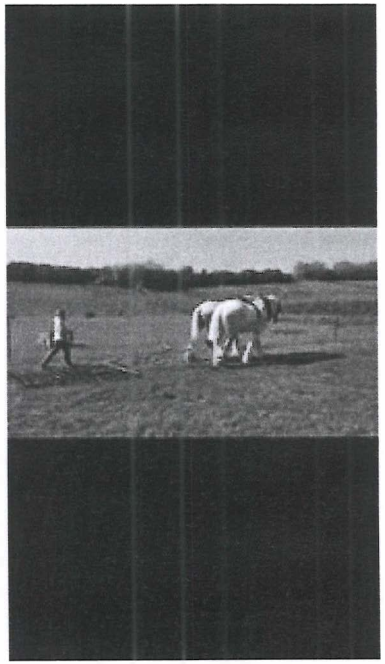
3. Do you need any qualifications or experience to chain harrow with horses, how long does it take to get competent at using them?

4. How long does it take to set up the chain harrows on the horses?

If you could please give detailed answers to these questions, this would be much appreciated. Any questions you need me to explain further or any other relevant information you may feel is adequate, please drop me an email.

Kindest Regards





309 Undertake a Specialist Project in the Land-Based Sector

Task 4

Title:

Horse vs Horsepower

Purpose of Project:

The purpose of this project is to compare the difference between horse or horsepower. What it means is that I am comparing a range of different objectives between a John deere 655 compact utility tractor pulling chain harrows (horsepower), against a shire horse pulling a set of chain harrows. this project will allow me to go into depth of detail about certain sectors to allow me to compare. This will then give a broad outlook on the who process for being able to chain harrow a field the two different ways. The whole process will give an insight of the initial costing of each, the maintenance fees needed, emergency fees and how long it would take to chain harrow one acres of field.

Overall, whilst being able to compare the two, to be able to see what one is more effective in certain areas, this will allow me to show and customers who are in the agricultural world to see the benefits of using a tractor or a horse; depending on their equipment they already have access to. This project also shows that even though there has been an advance in technology by using tractors, it is always still a viable option to use the more old/ traditional way farming was carried out before.

How was the project conducted?

This project has been carried out of the course of the year, focusing on each element of my aims gathering relevant information to find a set of results between the comparison of horse vs horsepower; (Horse pulling chain harrows, Tractor pulling chain harrows).

The beginning of investigating this project, the time was spent collating a range of aims/objectives to help gain a broad range of knowledge to either side allow me to sufficiently evaluate and conclude my results/findings. I managed to come up with 5 different objectives which all gathered different information for this project, which included:

1. **To research the costings of the tractor and the implement, and the costing of the horse and their implements**
2. **The maintenance needed for the tractor and their implement, maintenance of the horse and their implement. The costing of this.**
3. **The enjoyment of using a tractor and the enjoyments of using the horse**

4. **The efficiency of using the tractor or the horse depending on the size of the land.**
5. **The experience needed to use a tractor and the implement, and the experience needed to use a horse and the implement.**

Overall, this clearly set my direction of motive to research into these specific areas allowing to focus on the relevant information needed to carry out this project.

Once I had set out my aims and objectives, my time was majorly spent delving into the research for each of these areas. To research this, I used the internet to gather tractor data, horse data (including the horsepower of each and costings of each to buy etc.).

Much of my research was carried out by emailing and going to speak to different farmers and equestrians to gain their knowledge and views on each section, allowing me to gather up a plethora of information to use in my findings.

Over the course of this project, I had set out an action plan that was to be followed throughout to keep me on target to meeting specific deadlines. I kept checking where I was supposed to be along the plan ensuring I was following timings, having to adapt where needed if an issue arose.

Alongside the action plan I had specific milestones that I had to keep track of. This was to ensure that I had gathered all the needed information for each one of my aims and objectives.

Once I had gathered all the information that was needed, I then collated this all together into a document and wrote up about each section comparing the two together. This allowed me to study my findings and provide a conclusive result.

Throughout the project, I have been collecting information and writing them up in the 4 documents to showcase the whole process of my project.

Project results/findings:

1. **To research the costings of the tractor and the implement, and the costing of the horse and their implements**

John Deere 655 (Horsepower) 16hp	Shire horse (Horse) 15hp
Initial costing to buy: **£3,500**	Initial costing to buy: **£8,000**
Chain harrows: **£450**	Chain harrows: **£450**
Full tank of fuel: **£10.72**	Harness set: **£500**
Service: **£552.59**	Bedding: **£40**

Hydraulic breakdown: **£168.50**	Feed: **£117.90**
	Farrier: **£180**
	Vet check-up: **£250**
TOTAL: £4,681.81	**TOTAL: £9,537.90**

Overall, my results/findings for this aim and objective clearly show that after purchasing all different equipment that the Horsepower side is significantly cheaper at first. However, we do have to take into consideration that there is a lot more to buy to keep the horse, which could imply that it will take a lot more effort to upkeep the horse and less to manage the tractor over time. Overall, there is a £4,865.09 difference between the two.

2. **The maintenance needed for the tractor and their implement, maintenance of the horse and their implement. The costing of this.**

John Deere 655:

Service cost- To find out the costing of a service on this machine, I spoke to my work, Hollies Engineering, to see how long it would take to service and how much it would cost in parts, oil and labour. Upon speaking to them it would cost around £172.79 For parts. The parts include, engine oil filter, fuel filter, air filters and a hydraulic filter. It would cost around £79.80 in oils and liquids (engine oil (10-40) £12.84, tractor transmission fluid £63.80, antifreeze £3.16). It would then cost around £300 in labour costs. Overall, for a full service on this John Deere 655 it would cost a total of £552.59

Hydraulic breakdown- In my research, I am going to include the price of a hydraulic breakdown. One of the most common faults on a tractors hydraulic system is leaking pipework and seals. This is why in my research I am going to add a hydraulic breakdown into my costings to keep a tractor for chain harrowing. For this hydraulic breakdown, I am going to include the cost for 1.5 metres of pipe, the ferrules, couplers and labour cost. The costing for the pipe will be around £10.50. The costing for the parts (ferrules, couplers) will be £8 finally the labour cost will be around £150. Overall, the total cost for a common hydraulic breakdown will be around £168.50.

Fuel- To show the pricing of fuel for agricultural machines, I am going to be costing up the price to fully fill the tank of the john deere 655. This is to show the prices that will be included to run the machine. I have used the magazine Farmers weekly to find out the recent price of agricultural fuel. This week's price is 71p per litre of red diesel. The size of the tractors tank is 15.1 litres. This means that for a full tank of fuel it will cost £10.72.

Hollies Engineering is my local agricultural engineers, and they charge £75 per hour labour fees.

Shire Horse:

Feeding- To find out how much feed is used for a shire horse; I had emailed a local who owns a shire horse. To make up the hard feed, this will consist of 2 scoops Emerald grass pellets, 2.5 scoops Honey chop oat straw chaff, and 2.5 scoops marriages broad bran. The grass nuts will cost £36.40 a month. The chaff will cost £12 a month. The bran will cost £19.50 a month. Lastly a round bale of hay will cost £50 per month. When calculating the overall cost, I will be pricing up the cost of feed for only one month. Overall, to feed the horse for a month, it will cost £117.90.

Bedding- When looking after a horse, they will need to have bedding in their stable. I will be looking at the costing of wood pellets people have recommended these because they are efficient in soaking up the urine and absorbing the smell. This is easy to muck out and you can keep as much bedding as possible. The average shire horse will use two bags of wood pellets a week. 1 bag = £5. This means that in a month, the cost of the bedding will be £40.

Vetting Bills- when looking after horses, they will need to have general vet check-ups to ensure their health and welfare are being properly managed. This can happen all throughout the year; however, I have taken a usual cost for a vet check-up and found a call out cost, and price of medications. This will be around £250.

Farrier- In this project, I will be including one farrier visit as this is art of the maintenance to keep the welfare of the horse properly. I spoke to our local farrier who will shod shire horses and give them a set off shoes. They have said that the overall costing of this is going to be £180

Overall, my results show that both the tractor and the horse have a range of different requirements to keep up with the maintenance. As shown the horse will have more to keep up with the maintenance for the month, however due to the cost of labour at an agricultural engineering company, the tractor has a higher cost to maintain. This is shown as the over all cost for the maintenance of the horse is £587.90 whereas the tractor is £731.81. meaning that is would be more cost effective to maintain the horse over a month.

3. The enjoyment of using a tractor and the enjoyments of using the horse

John Deere 655:

When chain harrowing with the tractor, they have said that they love to be able to get up and start chain harrowing. They can start whenever they want if the tractor is in working conditions. They have said that they enjoy chain harrowing the field as this can sense some progress on the field whilst looking at all the land completed. They have said that a positive for them is that they are able to continue chain harrowing whilst having a drink and something to eat. A positive is that because they are sat on the tractor whilst chain

harrowing, they will not tire as easy as walking alongside the horse; especially if there is a large amount of ground to cover. A negative from chain harrowing with the John Deere 655 is that because there is no cab, the noise will be quite loud and can become straining on the hearing over a longer period. This means that they would have to put ear defenders on.

Shire Horse:

When chain harrowing with horses, they have said that they love harrowing with their horses as this gives them a sense of satisfaction. This is because there are using the horses for what they were meant for. (heavy horses were bred to be worked on farms, before machines were created). Once you have all the equipment, this is an easy way to keep the horses fit and healthy, whilst also completing farm jobs. The down sides they have said that this is more of a manual way to harrow the fields with more wavy lines, however if the farm doesn't have a tractor the horses are there to be worked. They have said this also helps increase their fitness as they must keep control of the horses and walk around the fields with the horses. Overall, chain harrowing with horses they have said that the positives outweigh the negatives.

Overall, my results for this aim tell us that there are both positive and negative views of chain harrowing with the tractor and with the horse. This shows me that there are always going to be some positives and some negatives to their enjoyments for each side, meaning that for anyone who wants to start chain harrowing, it all just depends on their specific preferences and what they enjoy most; machinery or horses.

4. **The efficiency of using the tractor or the horse depending on the size of the land.**

John Deere 655:

Set up harrows, testing and adjusting- 20mins

Speed of travel- 6mph (8.8ft per second)

Length of working time before rest- if tractor is well maintained and sufficient supply of cooling and fuel, can work for however long the operator needs.

Time to cover a one acre:

One acre is approximately 208ft by 208ft or the equivalent. This will equal to about 43,560 square feet. To work out how long it will take I will do the calculations of the width of the chain harrow, the time it will take to do 1 lap of the headland, the time it takes to travel down the length of the field (1pass) and how many passes it will take to complete the field. (6mph= 8.8ft per second)

Time it takes to cover the headland: 1minute, 36 seconds.

Time to complete one pass: 23seconds.

How many passes: 50 passes

Time to complete all passes: 19minutes.

Overall time to complete one acre with no breaks: 20minutes 36seconds.

Overall time to complete- **40mins 36seconds**

Shire Horse:

Set up and adjust harrows and harness- 40mins

Speed of travel- 4mph (5.8ft per second)

Length of working time before rest: a fully fit horse should be able to work up to 3 hours; whether a d terrain dependant)

Time to cover one acre:

One acre is approximately 208ft by 208ft or the equivalent. This will equal to about 43,560 square feet. To work out how long it will take I will do the calculations of the width of the chain harrow, the time it will take to do 1 lap of the headland, the time it takes to travel down the length of the field (1 pass) and how many passes it will take to complete the field. (4mph= 5.8ft per second)

Time it takes to cover the headland: 2minutes, 24seconds.

Time to complete one pass: 34seconds.

How many passes: 50 passes

Time to complete all passes: 28minutes, 24seconds.

Overall time to complete one acre with no breaks: 30minutes, 48seconds.

Overall time to complete: **1hour 10minutes 48seconds**

Overall, my results for this aim tell me that to set up and chain harrow a one-acre field, the tractor will complete this in a shorter amount of time. There are two clear factors that will affect the time. This is the length of time it takes to set the chain harrows up to the tractor or horse. And then the time it takes to cover the whole field, which is dependent on the speed at which they can both travel at. Dues to the fact that there is more to prepare on the horse before being able to chain harrow, means that it takes quite a bit longer that simply hitching and adjusting in the tractor. Overall, we can see that the tractor only takes 40minutes 36seconds, where the horse will take 1 hour 10 minutes 48 seconds.

5. **The experience needed to use a tractor and the implement, and the experience needed to use a horse and the implement.**

John Deere 655:

To use a tractor, you will need a competency ticket or a tractor licence. This means that there will need to be lots of practice before hand to learn the way around a tractor and how to fully operate the tractor. This also takes time to learn how to confidently hitch the tractor up to equipment. Once confident, you will then have to take the time to learn to drive in straight lines.

Shire Horse:

You will need to spend time learning how to handle horses and creating a bond with them. This will also include confidently tack them up with the equipment. You will then need to practice working them in a field to build up yours and the horses confidence.

Overall, my results show that there is one difference between chain harrowing with horse and with a tractor. Although they both require lots of time to practice being able to carry out the job successful and well, spending time getting to know the machine and the horses; the big difference is that to be able to legally operate the tractor anywhere other than you own private land, you will need either a competency ticket or a tractors licence.

Analysis of results:

When analysing these results, this has given me a wide range of information to compare each different side to the project. I can look at the pros and the cons for the aims and objectives allowing me to see the benefits of each side in different sectors and the negatives of each side for the sectors. This will ultimately decide the big question, what to use? Horse or horsepower to chain harrow a field.

Aim/Objective	John Deere	Shire Horse
1. To research the costings of the tractor and the implement, and the costing of the horse and their implements	More cost effective to buy all the equipment and all costing overall. £4,681.81	More expensive to buy all the equipment and the overall costings for the horse. £9,537.90
The maintenance needed for the tractor and their implement, maintenance of the horse and their	A service and a hydraulic breakdown will have an overall cost of £731.81	For the feed, bedding vet bills and a farrier visit it will have an overall cost of £587.90

implement. The costing of this.		
The enjoyment of using a tractor and the enjoyments of using the horse	Start at any time in day without worrying about setting up. They will not get too tired as they are sat down and able to have some water or a snack. As there is no cab there will be constant loud noise which can cause a headache over a period	Gives a sense of satisfaction, by using horse what they are meant for. Easy way to work the fields and keep horses fit and healthy. More manual way to harrow a field longer to set up and complete, always trying to keep full control.
The efficiency of using the tractor or the horse depending on the size of the land.	overall time to set up and complete one acre is 40minutes 36seconds	Overall time to set up an complete one acre is 1hour 10minutes 48seconds
The experience needed to use a tractor and the implement, and the experience needed to use a horse and the implement.	Need tractor licence or competency ticket. Takes time to learn how to use the machinery, drive in straight lines	Need to spend time with the horses to build your and their confidence. Confidently tack up a work them in field. Not licence needed.

Review of information gathered:

Shire Horse:

I gathered my information from a range of different areas. These have included email to the farmer who owns the shire horse that was used in my project. I have also used other websites to gather price information on horses. To find out the costing of basic needs (feed bedding etc) I asked a local owner of a shire horse to get an insight into the costing to keep a shire horse. Finally, I used eBay to find out the pricing for chain harrows.

Emailing- I used email to contact the farmer to gain lots of different information on their perspective of using the horse whilst chain harrowing. I chose to email to gather information as they have real experience in the horse world, rather than using the internet which could be accurate, but may have some misleading information. This also means that for my project I can get a real-life example of someone chain harrowing, allowing me to show people that it still can be done rather than using information for many years ago. They also were able to give me a personal feeling about them chain harrowing which is far better than using the internet to try hand figure out what it would

be like to chain harrow with horses. Emailing the farmer was a good plan as she was able to respond quickly with all the relevant details specific to my project meaning that this allowed me to be efficient in completing my project. Overall, I feel that emailing the farmer was a good choice to gather my information due to the swift and efficient replies gathering all the key relevant information.

Internet- I used a range of different websites to compare the prices between the shire horses. I used websites such as Horse mart, Shire Horse Society and E horses. All these websites are quite reliable by giving me the relevant breed of horse and showing the specific prices. By using 3 different websites, this allowed me to evaluate and compare the prices giving me and average overall price. Overall, I think that theses websites can be accurate with the pricings, especially the shire horses own website, however, sometimes there may be an inaccuracy with the price due to the horse not being broken to pull or is injured etc.

Speaking to local owners- I think that speaking to the owners of a shire horse is a completely true perspective of the costings and time it takes to look after a shire horse. They can give statistics and data that is true to the prices that they ay to be able to feed, bed and overall health of the horse. This just goes to show that some people think that it is too expensive to own a horse yet, from speaking to people who do own the shire horses they are able to tell me that they can go different approaches, even keeping to the simple feeding methods like they used to do back in the day, keeping the cost down. Overall, I think that speaking to local owners of shire horses is an incredible source of information as this allows to gain real time information and the truth behind looking after a shire horse.

eBay- I had to look at buy a set of second-hand chain harrows; meaning that the quickest and most common place to look for anything second-hand is eBay. This is an excellent place to find things to buy as they are reliable, as many people use this site, plus this will give you a price straight away for the chain harrows. this is an easy way to quick find what I am searching for making this a perfect site for this project. Overall, eBay is a perfect site to use to buy chain harrows.

John Deere 655:

I gathered all the information about the John Deere 655 using a range of different information sources. These include, using websites such as farm machinery locator, small tractors and tractor house to find the costing of a second-hand John Deere 655. To understand all the different data on the engine, capacities and or specifications, I used a website called tractor data. To understand the cost of a breakdown, service, I contact a local agricultural engineering company (Hollies Engineering) who were able to give me the full prices of each component needed for a service, breakdown and their labour costs. I also used eBay to find a second had set of chain harrows. Finally, I used email to email a local farmer who owns a john deere 655 to gain their knowledge and experiences whilst chain harrowing with the tractor.

Internet- To be able to find out the costing of the second-hand John Deere 655, I was able to use the internet to look and different websites such as farm machinery locator, small tractors and tractor house to compare different price ranges for the tractor. When looking at the specific tractor the websites were able to give me prices and a range of different quality conditions of the tractor. This allowed me to calculate an average price for a second-hand John Deere 655. These websites are quite reliable as there is a wide range of buyers who use these websites to buy all different types of tractors. Overall, these websites allow me to gain knowledge of the different types and their prices relatively easy.

Tractor data- when finding out the specific data for this tractor, I was able to use a website call tractor data. This allowed me to see all different specification on this tractor, for example the engine make model, fuel capacity, oil capacity and so on. This is a reliable source of information as lots of people use this website to find their data for their type of tractor. Overall, this is a suitable source of information to use for this project as this gives the sample data that I needed to figure out costings for oils etc allowing me to complete this project.

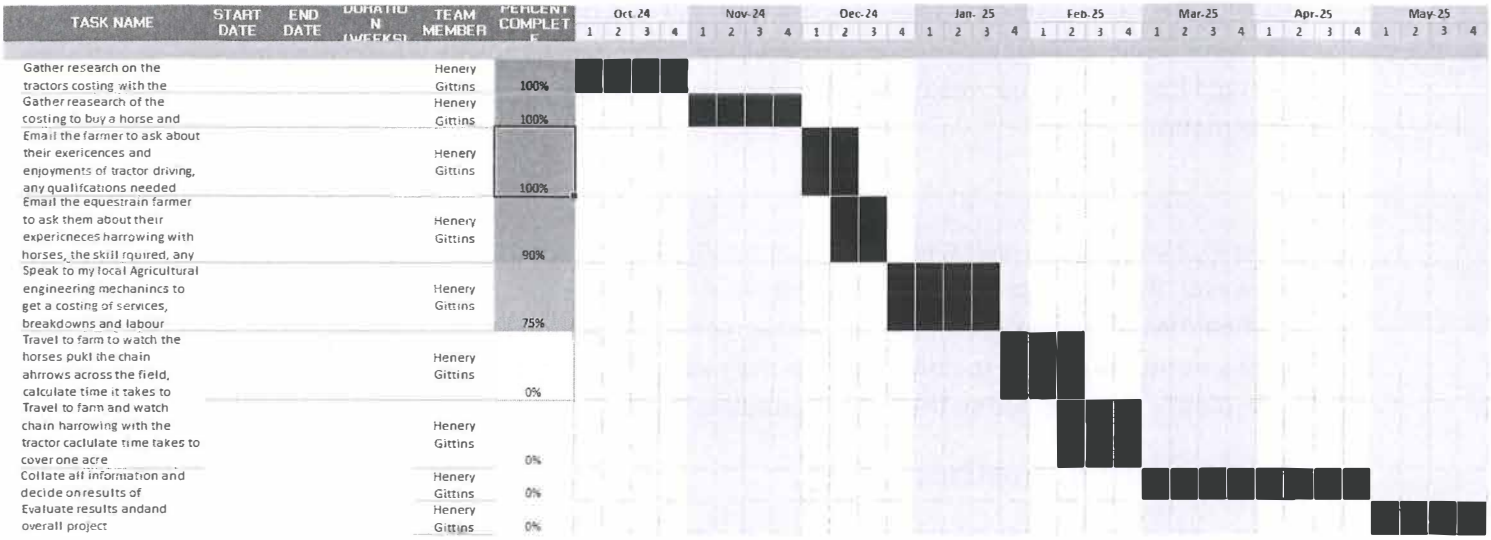
Hollies Engineering- To figure out the costings and time for a hydraulic breakdown, and a service on the tractor, I spoke to my local agricultural engineers to get the prices for all the filters and the oils, also including the costing for labour. This is an extremely reliable source to gather information as they are giving me the correct prices exactly for this tractor rather than guess whilst using the internet. Overall, this is an excellent way to find out some information they are the ones who will supply with the parts and carry out the service itself.

eBay- I had to look at buy a set of second-hand chain harrows; meaning that the quickest and most common place to look for anything second-hand is eBay. This is an excellent place to find things to buy as they are reliable, as many people use this site, plus this will give you a price straight away for the chain harrows. this is an easy way to quick find what I am searching for making this a perfect site for this project. Overall, eBay is a perfect site to use to buy chain harrows.

Emailing- I used email to be able to contact a farmer about all different specific information relevant to my project. I chose to email the farmer about chain harrowing with the John Deere 655, as this allowed me to ask them specific questions relevant to my aims and objectives; to be able to get a clear answer back from them to allow me to focus on the key information that I need rather than scrolling through irrelevant information on the internet. Another point is that emailing a farmer who regularly uses the tractor, they were able to give me real life experience of being able to use that specific tractor making me results for the project more accurate. Overall, I think that emailing the farmer for the tractor is a brilliant and reliable source to gather information for this project as they can give you true statements that help increase the accuracy into the results of the project.

Overall, I think that the best source to gather information for this project would be the emailing of the farmers. This is because they were able to use their real-life experiences and knowledge to give me specific and direct answers to be able to allow me to quickly fill out and complete thus project.

Action plan Evaluation/ problems of deadlines and contingency plans:



TASK NAME	START DATE	END DATE	DURATION (WEEKS)	TEAM MEMBER	PERCENT COMPLETE
Gather research on the tractors costing with the				Henery Gittins	100%
Gather reasearch of the costing to buy a horse and				Henery Gittins	100%
Email the farmer to ask about their exericences and enjoyments of tractor driving, any qualifications needed				Henery Gittins	100%
Email the equestrain farmer to ask them about their experiencneces harrowing with horses, the skill rquired, any				Henery Gittins	90%
Speak to my local Agricultural engineering mechanincs to get a costing of services, breakdowns and labour				Henery Gittins	75%
Travel to farm to watch the horses pukl the chain ahrrows across the field, calculate time it takes to				Henery Gittins	0%
Travel to farm and watch chain harrowing with the tractor caclulate time takes to cover one acre				Henery Gittins	0%
Collate all information and decide on results of				Henery Gittins	0%
Evaluate results andand overall project				Henery Gittins	0%

This is my action plan for when each section of my project was supposed to be completed throughout the year. I think that this is a clear representation of what should be completed and when is should be completed. Throught the course of the year, I was able to keep checking back on the plan to see if I am on schedule or whether I was falling behind due to so issues and changed of plans. For the beginning of this project, I was able to follow this plan, completing each section for their due date allowing me to keep on task and focus. This means that I was able to complete the research portion on time and send out the emails to the farmers awaiting their response.

However, some setbacks, caused me some delay withing the project which made me fall slightly behind schedule according to my action plan. Despite having some setbacks, I was able to come up with a contingency plan to work my way around these problems to allow myself to get back on track and catch up with days missed.

Issues causing me to fall behind on action plan-

Since I am at college studying agricultural engineering, I had my first-year exams. This meant that sometimes, my study for these exams too priority over the project, meaning that I was falling behind on the schedule. However, I was able to use the rest of the free time to try and catch up with research where needed.

Due to the weather, we were unable to get out on the field with the tractor and change harrows as this would have just sunk into the ground and ruined the field rather than benefit this. This means that I took this part of the project to a more research based and

just asked them to send me previous information about when they last chain harrowed the field. I waited to see if the weather would clear up before switching to research, however there was no change in the weather and had to then change to research. This unfortunately set me back a week.

Due to horse availability, I was unable to travel out to the farm to see the horse chain harrow the field. Unfortunately, the shire horse that I was going to use, got injured in the field and caused him to go lame. I used my time to try and search for a different shire locally that could pull chain harrows but couldn't find one in time. This meant that I was set back a few days but was able to email the farmer again and ask if she had previous footage from when she was chain harrowing the fields giving me all the relevant information.

Overall, I began my project, remaining on schedule, completing to the due dates. However, during the practical side, there were many setbacks that caused me to lose some time and fall behind slightly. That didn't matter though as once I had figured out a way around, I was able to continue with the research and gather all information completing this project on the overall deadline that was set for the year.

Evaluation of methodology:

1. My first aim is to look at the costing of the tractor and the implement and the costing of the horse and the implement. To find this out, I am going to research on the internet what is the equivalent horsepower to a horse so I can use a fair comparison between a tractor and a horse. Once I have found the equivalent horsepower tractor, I will be looking at the initial costing on the brands website and how much it would be to buy the implement that I am going to use. Once I have added this all up, I will then look at the type of horse needed to pull the implement and how much it will cost to buy, including the harnessing needed to pull the implement. Overall, this aim is to find out the initial cost of tractor and implement, and horse harness and implement.

This is my methodology for the first aim. To find out the costing of the tractor + harrow and the costing of the horse + harrow. I think that this methodology was relatively effective, because I was able to find the websites that gave me the exact information that was needed. This methodology was effective as I was able to gather all the correct information to carry out my project.

2. My second aim is to work out what is going to be needed to maintain the tractor and the implement, and what is going to be needed to maintain a horse and their equipment. To find this out if will going to the brands dealership and questioning how much a service will be for the tractor that will be used and what is the overall maintenance costing. This includes any oil changes, fixes, and fuel that is going to be needed. After finding out the tractors needs, I will then go to a horse yard and find out the costs of the maintenance for a horse. This includes the farrier for

shoes, bedding feed and vet bills. I will the collate this data together and determine what is more beneficial and cost effective to maintain each one.

This is the methodology for the second aim. I was not able to contact the tractors main dealer to find out the service cost and changed it to be an affordable agricultural engineering company (hollies engineering). This has allowed me to get the information quicker and cheaper than if I was to go to the main John Deere dealers. I think that the horse side of this methodology was very effective as I was able to go to my local horse yard to speak to the owners of the shire horse and they were able to tell me about the exact numbers for the feeding, bedding, vet bill etc.

3. For my third aim, I am going to be looking at the enjoyment of using a tractor compared to using and horse. To find this out, I am going to be going round to farmers and users of these implements and asking the how much they enjoy doing their job either on a tractor or using a horse to do the work. This can be the enjoyment of the actual work on the land and the enjoyment of looking after the tractor and the horses. I will the collect this data given to me and write down the pros and the cons between the two.

This is the methodology for my third aim. I slightly changed this method as I was emailed the farmers to ask for their enjoyments of using the tractor or using the shire horse. This methodology would have been more effective to complete this aim as I would have gotten a wider range of opinion and compared the two, however due to lack of time from delays, I had to just email for results to this aim.

4. My fourth aim I am going to be looking at the efficiency of using a tractor or a horse. This can vary depending on the size of the land. To also find this out, I will be looking at the speed at which each one can work at and how long you can work them for at any one time. The availability of each one during the year, and the conditions that they can be worked in. overall this area is to show how efficient and versatile each area can be depending on the environment at the time and how much land a person has.

This is the methodology for my fourth aim. This methodology was very effective as I was able to figure out the size of chain harrow that I was going to use for the tractor and the horse, then find out at which speed each chain harrow the fields. This allowed me to then figure out how long it would take them to cover one acre of field, completing many calculations. I was also able to include how long it took to set up the chain harrows on the tractor and on the horse. This overall allowed me to figure out the total time needed for the efficiency of using each. Overall, this methodology was very effective in finding out the efficiency of covering one acre of field

5. For my last aim and objective, I am going to be researching the experience that is going the be needed to use either the tractor on the land or the horse on the land. This will include the competency level that the operator will need to be at and whether they will need to have and previous qualifications to work the machines.

This is my methodology for my fifth aim. This was a very effective methodology to figuring out the experience needed for this project. I was able to email to find out all the different competency, and the experiences of tractor and horse. Overall, this methodology worked very well as I was able to ask the questions to the farmers and they gave me back the relevant information to complete this aim effectively.

Strengths/weaknesses in this project:

In this project there has been so strengths and there has been some weaknesses whilst I have been completing sections.

Strengths- In this project, I think that a strength of mine is to collect all the data that I have available and comprise this into documents which clearly shows my deep understanding of what I am researching and comparing. This is shown by the depth of detail that I put into each section of the write ups, integrating the information that has been gathered. Being able to pull the key information out and put them into a table to show an overall result. Overall giving a wide range of points and information to others to show the different facts to having a tractor and chain harrows or a shire horse and chain harrows.

Another strength of mine is that I can confidently talk to people, for example being able to go and speak to the local horse owner and gather the correct information to be able to complete that section in the project. Another example is going to my local agricultural engineering company and speaking to them, getting all the parts and labour needed for a service and breakdown.

Weaknesses- I think that a weakness for me throughout this project is being able to remember to send out the emails and write down all the information more efficiently. Meaning that I could have been able to alter my plan earlier than I had to allow myself extra time to complete certain section rather than waiting longer and pushing to the limits of the deadline.

Another weakness for me is that I didn't have much of a backup plan straight away in the beginning of the project, meaning that I didn't just stick to this issue straight away and kept on track for the action plan; overall leading to me to fall behind slightly.

Improvements for next time- if I was to complete this project again, I would ensure that I am keeping fully up to date with all areas in this project, making sure that I am sending out emails straight away, so I don't have to wait too long for a reply. Also making sure that I keep a set back up plan in case the weather or any other issue doesn't set me back on my action plan and deadlines.

Conclusion/ summary:

Overall, my results have shown me that these are two completely different styles of life for chain harrowing. The idea of compare was to see the differences between the two

and to see which one is better overall. However, upon researching this project, I believe that they both have their equal pros and cons meaning that in some areas such as initial costs, yes, the tractor and chain harrows may be cheaper, but in other areas such as the amount of experience and qualification it is quicker and more rewarding with the horse and chain harrows. this goes to show that there is no better option it all just depends on the preferences and lifestyle that a farmer chooses to live. Meaning that this project results have shown a fair and equal number of opinions in all different sectors that farmers would like to know about before choosing to chain harrow.

Whilst carrying out this project, I have also realised that even though it may take slightly longer to harrow a field with a horse, It can be more enjoyable and rewarding, going to show that even with advances in technology now adays, taking it back to traditional ways before tractors can be not only environmentally more stable but can be far more enjoyable to carry out.

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